

# **Centrality determination in eA collisions using forward neutron based on BeAGLE**

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# Goal

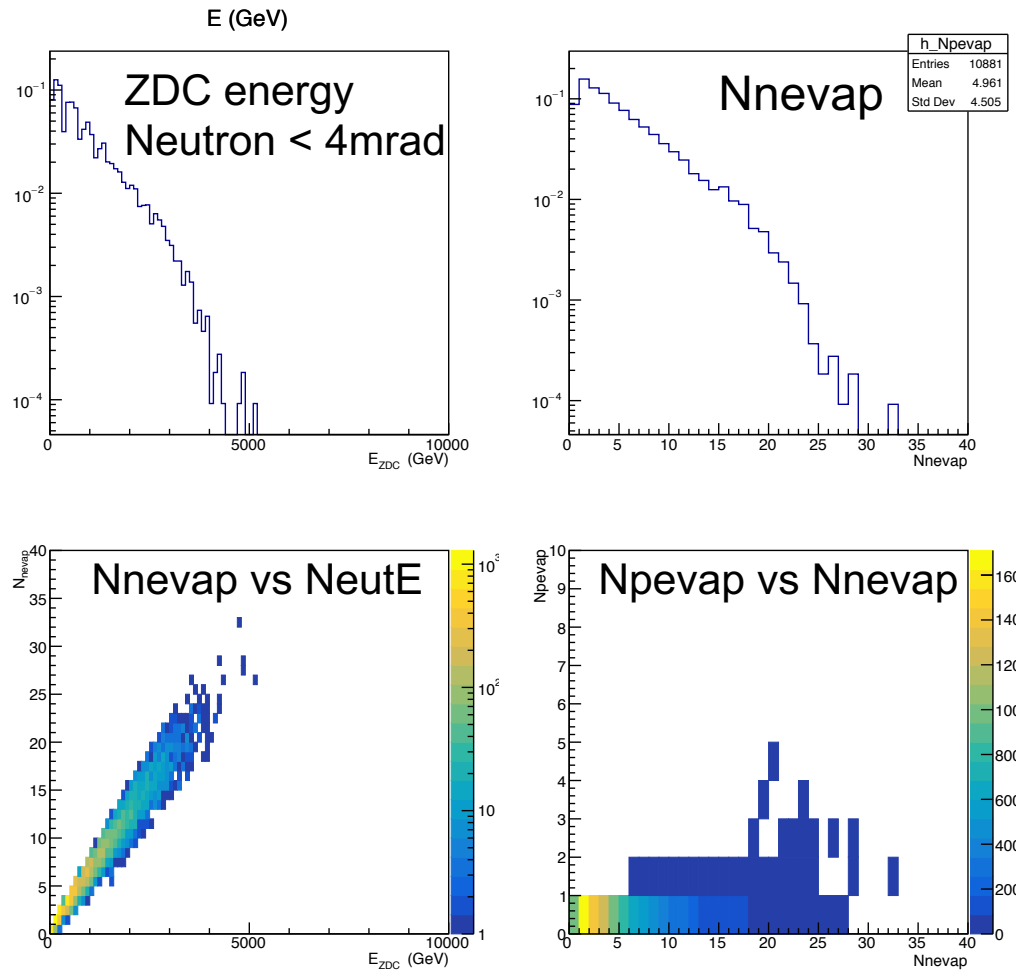
- First BeAGLE paper, besides introduction of BeAGLE:
  - Centrality determination using forward neutrons
  - Neutron energy cut on  $b$ ,  $T(b)$ ,  $d$
  - $N_{\text{neut}}$  cut on  $b$ ,  $T(b)$ ,  $d$
  - E665 comparison with kinematic variables.
  - Anything else we want to add?
- Target Journal ~ PRC
- Target timeline ~ < a few months, by the end of August?
- Leading PA : Wan Chang

Here, I just did a quick look and some initial setups. Wan will take over soon and fine tune (~redo) the analysis.

# BeAGLE

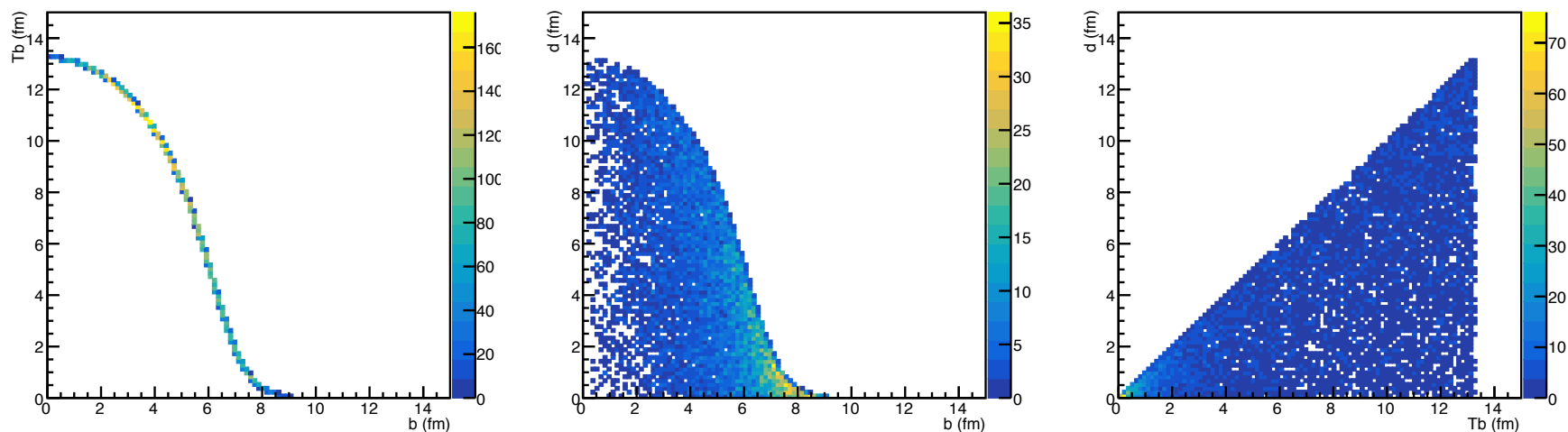
- Input files live under */eicdata/eic0003/ztu/BeAGLE\_Centrality*
  - ePb\_40k\_Shd3\_tau9\_kt=ptfrag=0.32\_noquench\_US1.inp
  - eAS3noq
  - 18x135 ePb collisions. No quenching.
  - $0.01 < y < 0.95$ ,  $1 < Q^2 < 20 \text{ GeV}^2$
  - 40k events
  - $\tau_0 \sim 9 \text{ fm/c}$
- Someone should check the control cards and inputs.
- Should run a few different settings, e.g., different energy, different kinematic regions (?) and ...
- Pb probably good enough. Liang and Elke used gold.
- In the paper, we should also **prepare an example control card**, which could be the one we use for this analysis.
- No energy resolution is added. Perfect detector and resolution.

# Nnevap vs NeutE



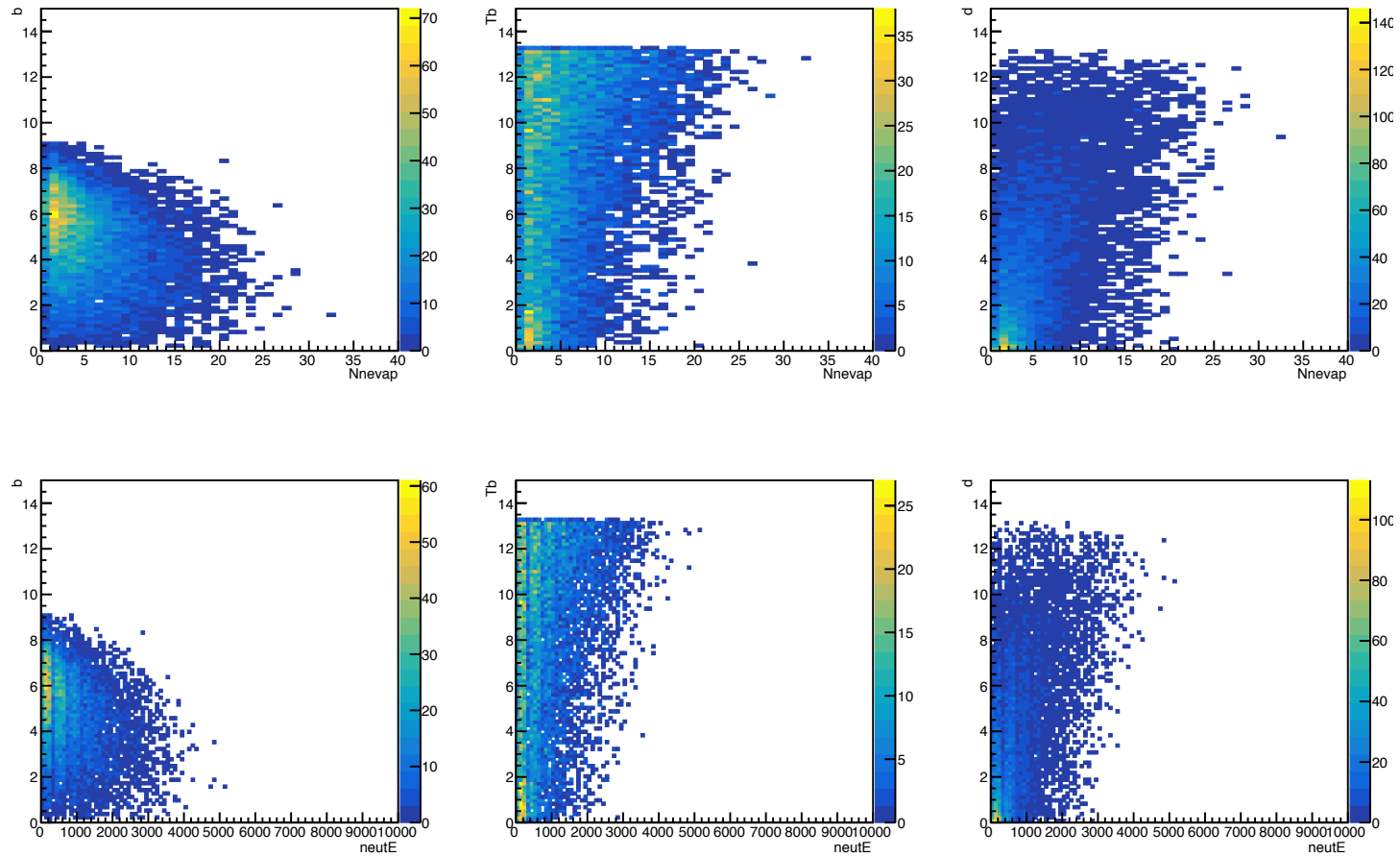
Perfect ZDC. Acceptance cut is < 4 mrad

# $b$ , $T(b)$ , and $d$

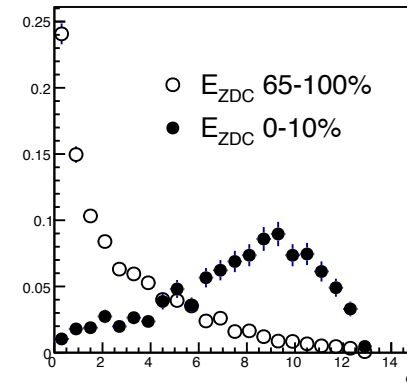
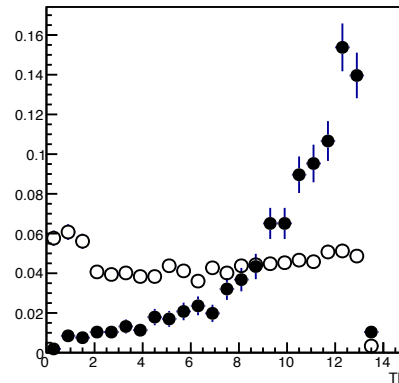
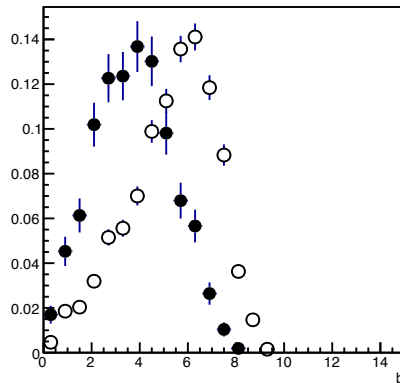
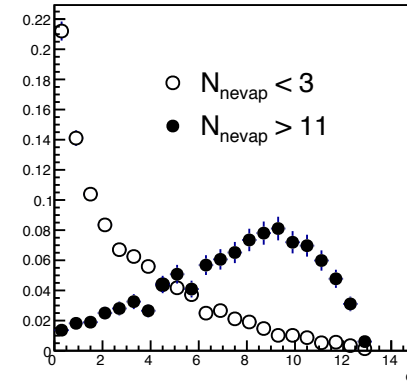
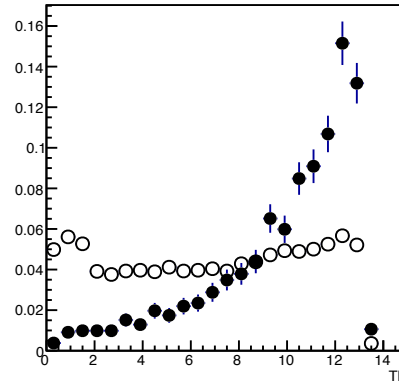
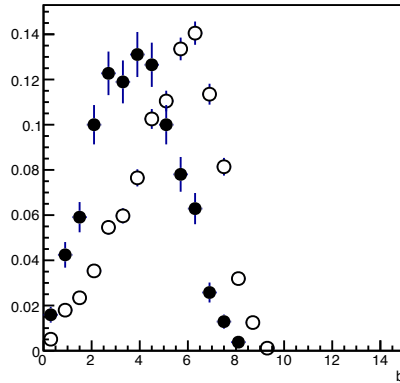


Three variables that might tell us the “centrality”

# Nnevap and NeutE vs $b$ , $T(b)$ , and $d$



# Cut on Nnevap or NeutE



Two ways of selecting centrality seems equivalent. ZDC energy is more accessible and practical? STAR ZDC can only see  $\sim 4$  neutrons.

# Summary

- Centrality determination using ZDC neutron energy seems working. Results look promising.
- More fine-tuning to come but should be straightforward.
  - e.g., add detector resolution of ZDC
  - Give a few assumptions of ZDC energy resolution
- Do we expect a new version of BeAGLE? Or shall we publish this current version first?
- For the next meeting (sometime in August?). I hope by then we can select/finalize the main figures that we want to put in the paper.